

# NDCEE

National Defense Center for Environmental Excellence



**DoD Executive Agent**

Office of the  
Assistant Secretary  
of the Army  
(Installations and  
Environment)

## Evaluating the Impact of Emerging Contaminants Using ECAT<sup>SM</sup> and ICAT<sup>SM</sup>

**Joint Services Environmental Management  
Conference  
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# Agenda

## ■ Background

- Emerging Contaminants (ECs)

## ■ Tools

- Objectives
- Emerging Contaminants Assessment Tool (ECAT<sup>SM</sup>)
- Impact Criteria Assessment Tool (ICAT<sup>SM</sup>)

## ■ Application

- Naphthalene

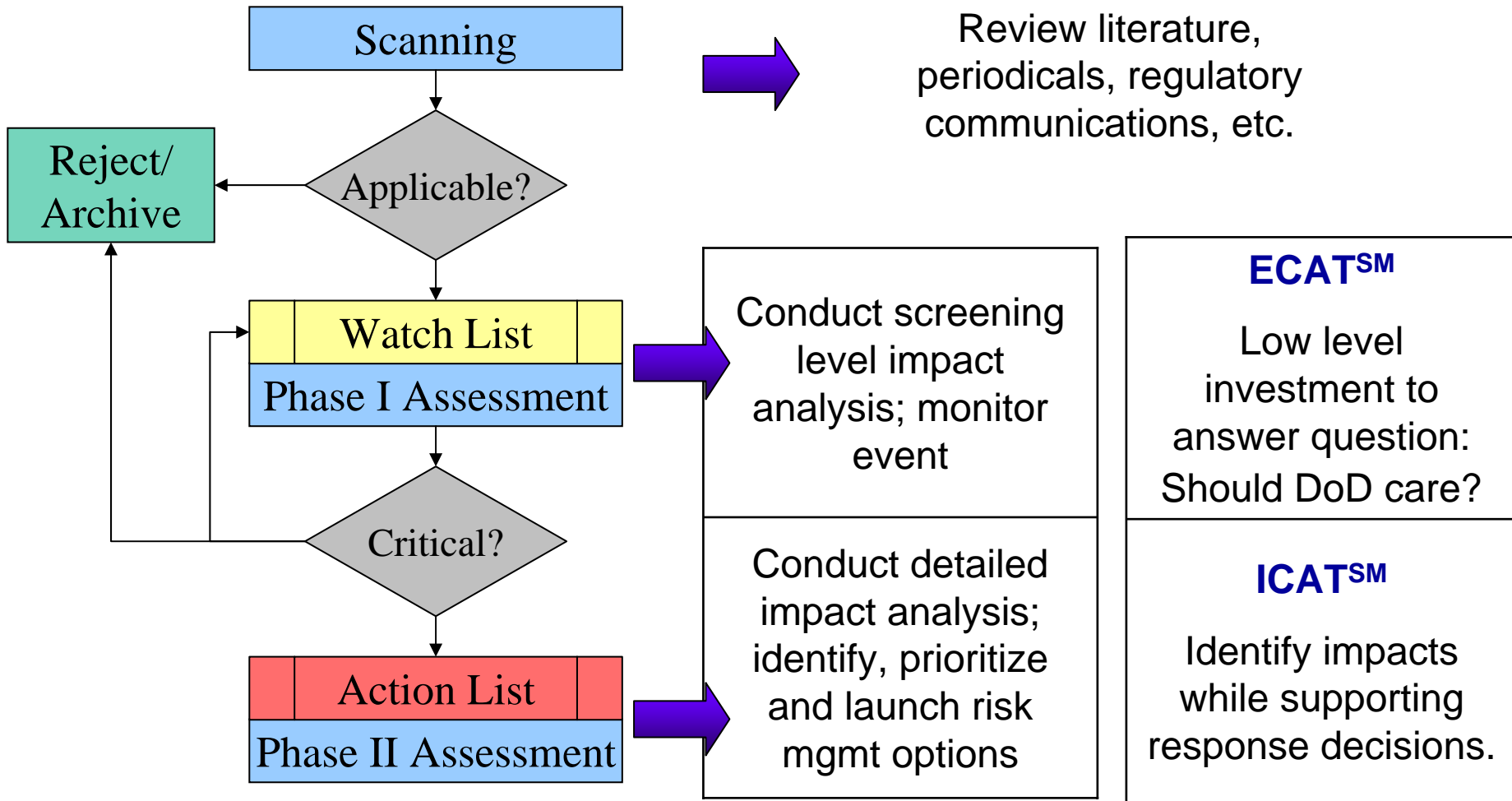
# Emerging Contaminants (ECs)

- Chemical or material
- Real or perceived threat to human health or the environment
- No peer reviewed health standard or an evolving standard
- Evolving regulatory interest
- May also have
  - Insufficient human health or environmental data/science
  - New detection limit
  - New sources or pathways of exposure

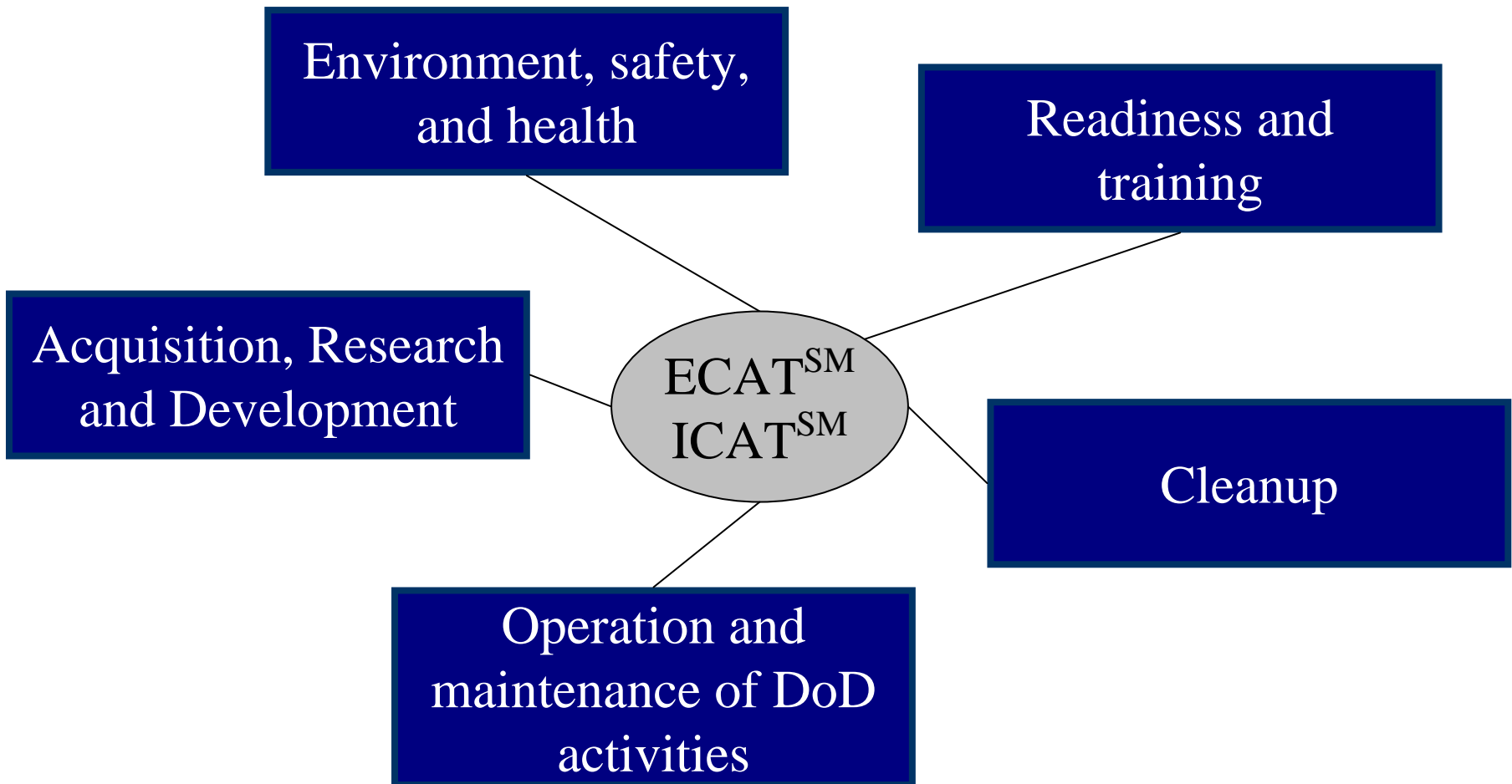
# Objective

- Develop tools for evaluating the impacts of new or changing ESOH regulations and standards on DoD operations and mission.
  - Emerging Contaminants Assessment Tool (ECAT<sup>SM</sup>)
  - Impact Criteria Assessment Tool (ICAT<sup>SM</sup>).

# Support MERIT EC Assessment Process



# Impact Areas



# ECAT<sup>SM</sup>

## ■ What it is?

- MS Excel® spreadsheet tool for facilitating and documenting important database reviews by Subject Matter Experts (SMEs).

## ■ What does it do?

- Establishes a process for evaluating EC with widely-available, generally-accepted databases to determine the severity and impact of changing regulations on the DoD.

## ■ Why is it important?

- Facilitates a review of key database information categories for use by SMEs in a manner that is consistent, defensible, and documented for Phase I activities



# Directs SMEs to Public Access Databases

Public Access Databases	Sections of Interest
<b>ToxProfiles</b>	Health Effects, Potential for Human Exposure, General Population & Occupational Exposure
<b>IRIS</b>	Carcinogenic Assessment for Lifetime Exposure
<b>HSDB</b>	Human Health Effects, Environmental Fate & Transport, Manufacturing Information
<b>CERCLIS</b>	List of sites with contaminant, Ranking of potential and actual human exposures
<b>Scorecard</b>	Human Health Hazards, Hazard Rankings, Chemical Use Profile, Chemicals Reported by Environmental Releases
<b>Priority Chemicals and Fact Sheets</b>	Uses of a Contaminant, Potential Health Effects, Routes of Exposure
<b>TRI</b>	Substance Identification, Environmental Release of Chemical
<b>TRI e-FDR</b>	Chemical Information
<b>SIRI MSDS Index</b>	Hazards Identification, Exposure Controls/Personal Protection, Toxicological Information, Ecological Fate
<b>Household Products</b>	Category, Percent
<b>ITER</b>	Risk Data
<b>TOXMAP</b>	Identify Releases
<b>ChemIDPlus</b>	Toxicity
<b>CCRIS</b>	Carcinogenicity Studies, Mutagenicity Studies
<b>GENE-TOX</b>	Mutagenicity Studies
<b>TRI Explorer</b>	Total Off-site Disposal or Other Releases, Total On and Off-Site Disposal or Other Releases
<b>ATSDR</b>	Health Effects, Production, Import, Use & Disposal, Potential for Human Exposure, Regulations & Advisories, Appendices
<b>TOXLINE</b>	Abstracts
<b>DART</b>	Abstracts
<b>Table Z-1</b>	Air Contamination Values
<b>Table Z-2</b>	Acceptable Ceiling Concentration
<b>Table Z-3</b>	Exposure Limits

# Directs SMEs to Limited Access Databases

Limited Access Databases	Sections of Interest
<b>HMIRS</b>	Hazards Identification, Exposure Controls/Personal Protection, Toxicological Information, Ecological Fate
<b>FEDLOG</b>	Items in the DoD Supply System
<b>MIDAS</b>	Chemicals used in munitions
<b>ERIS</b>	Chemical, Geological, Geographical, & Remedial Action Data
<b>NORM</b>	Analytical Chemistry Samples, Tests, Results, Hydrogeological Information, Site/Location Descriptions, Monitoring Well Characteristics
<b>AF-EMIS</b>	Hazardous material tracking, MSDSs, Electronic review and authorization
<b>HSMS</b>	Tracking of hazardous products, chemicals, waste containers, container contents
<b>TRI DDS</b>	Environmental exposure data
<b>ERLS</b>	Daily chemical and isotope inventories, Notification of chemicals nearing of exceeding threshold quantities
<b>DoD Occupational Database</b>	Data on DoD personnel

# SME Assigns Potential Impact Scores

- For each database and each impact area, SME assigns a potential impact score (6 for “Very High”, 2 for “Very Low, and 1 for databases that are not applicable or provide no useful information).
- Under the “Comments” section, SMEs list any relevant information about the contaminant.

	Database	Access Site	Categories of Interest	Environment, Safety & Health	Readiness & Training	Acquisition/R&D	O&M of DoD Assets	Cleanup	
4	PUBLIC ACCESS DATABASES								
5	ToxProfiles	<a href="http://www.atsdr.cdc.gov/toxpro2.html#A-">http://www.atsdr.cdc.gov/toxpro2.html#A-</a>	<p>ToxProfiles is organized by contaminant name.</p> <ul style="list-style-type: none"> <li>• <b>Health Effects:</b> health effects resulting from contaminant exposure</li> <li>• <b>Potential for Human Exposure:</b> discusses routes of contamination, provides a figure that illustrates the frequency of sites with contamination</li> <li>• <b>General Population &amp; Occupational Exposure</b></li> </ul>	6 - Very High	6 - Very High	6 - Very High	6 - Very High	6 - Very High	<ul style="list-style-type: none"> <li>► Evaporates easily, through air</li> <li>► Easily passes thru contaminate well wat</li> <li>► Exposure can res</li> <li>► Has been found to nose and lung tumor</li> <li>► Frequently present emission, naturally o and emissions, usec resins, and insectic</li> </ul>
6				5 - High	5 - High	5 - High	5 - High	5 - High	
7				4 - Moderate	4 - Moderate	4 - Moderate	4 - Moderate	4 - Moderate	
8				3 - Low	3 - Low	3 - Low	3 - Low	3 - Low	
9				2 - Very Low	2 - Very Low	2 - Very Low	2 - Very Low	2 - Very Low	
10				1 - N/A	1 - N/A	1 - N/A	1 - N/A	1 - N/A	
11				5	4	5	4	5	
12									

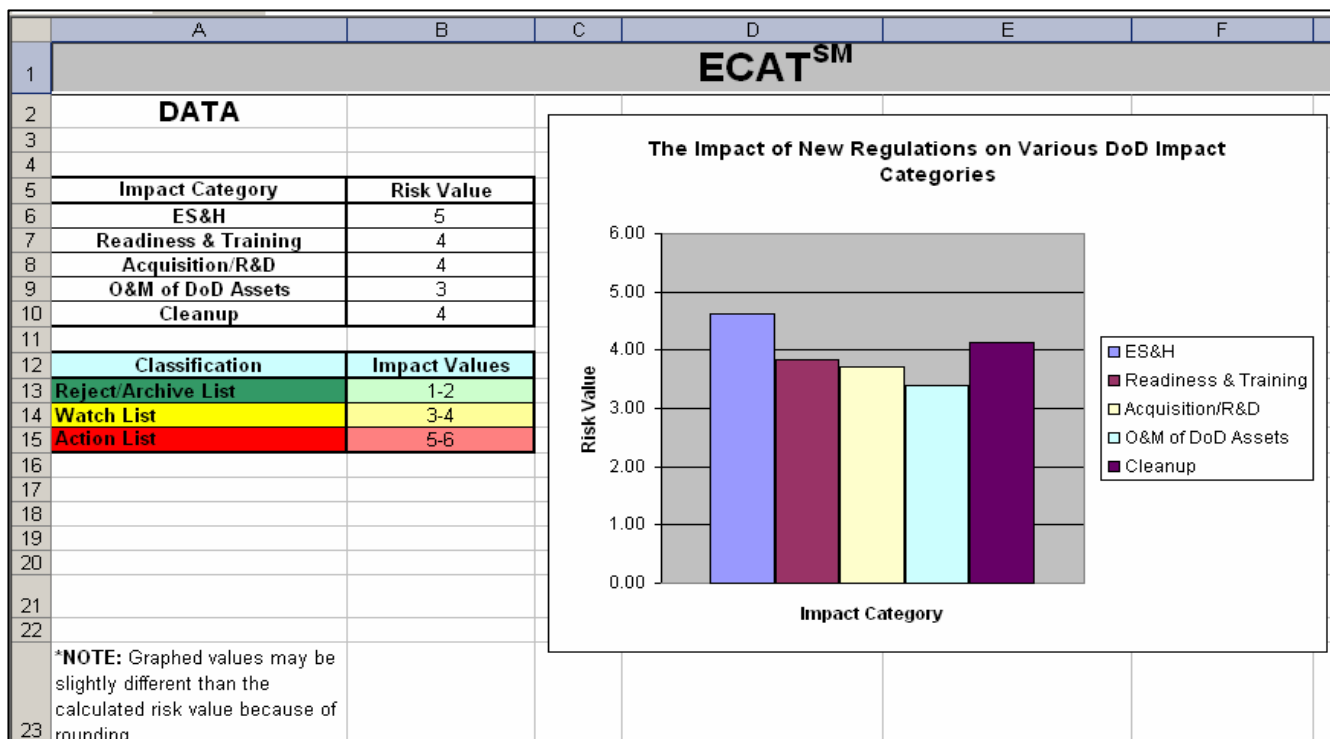
# ECAT<sup>SM</sup> Calculates Contaminant Impact Value

- ECAT<sup>SM</sup> calculates a “Contaminant Impact Value” (CIV).
- Used to suggest how the EC should be classified
  - Action List: 21-30
  - Watch List: 11-20
  - Reject/Archive List: 1-10.

	A	B	C
1	ECAT <sup>SM</sup>		
2	NAPHTHALENE		
3	91-20-3		
4			
5	Table 1. Values for determination of the impact of a contaminant to the DoD if all five impact factors are considered.		
6	Contaminant Impact Value	Classification	Impact Values
7	20	Reject/Archive List	1-10
8		Watch List	11-20
9		Action List	21-30
10		Conclusions/Comments  Naphthalene is classified on the high end of the "Watch List" because it is commonly used in the DoD as a jet fuel constituent and as an industrial chemical. Furthermore, it is a common intermediate in plasticizers and is released into the air by automobile emissions. Currently, there is very little conclusive human toxicity information; however, naphthalene exposure does result in hemolytic anemia in humans. In animals, naphthalene exposure has resulted in cataracts, lung inflammation, alveolar/bronchiolar adenomas, hemangiosarcomas, lung tumors, and other harmful health effects. Consequently, new EPA regulations on naphthalene would affect DoD facilities, especially if human toxicity studies on naphthalene confirm that it is a human carcinogen.	
11			
12			

# ECAT<sup>SM</sup> Provides Impact Category Comparison

- Based on SME input, ECAT<sup>SM</sup> compares the impact of new regulations across the Impact Categories.



# ICAT<sup>SM</sup>

## ■ What it is?

- MS Excel® spreadsheet tool for determining the likelihood and severity of impact of new/changing regulations on DoD facilities.

## ■ What does it do?

- Establishes a risk scoring system for evaluating the likelihood of an adverse impact as a result of regulatory, scientific, or political changes for emerging contaminants.

## ■ Why is it important?

- Facilitates the assigning of a risk score and prioritizing those risks for action in a manner that is consistent, defensible, and documented for risk balancing activities.

# SME Considers Impact Categories

- For each Impact Category, the SME evaluates the types and sources of risk.
- For example, major ES&H Impact Categories include:
  - Chemical Release
  - Scope of Exposure
  - Relative Change in Health Endpoint.

ICAT <sup>SM</sup>				
CONTAMINANT 1				
CAS No. ###-###-#				
ES&H Impact Category	Evaluation Criteria	Likelihood of an Adverse Impact as a Result of Regulatory, Scientific, or Political Change (%)	Severity of the Impact to the DoD	Overall Risk of ES&H Impact Factor to the DoD
		0.05: Will not happen or is very unlikely  0.1: There is a slight possibility that the impact element will be affected  0.3: The impact element may be affected  0.5: The impact element probably will be affected  0.8: The impact element will definitely be affected	0.01: Exposure to the material/chemical of interest will not have any serious health repercussions. • Measures can be easily taken to protect workers from any harmful effects.  0.02: Release of the chemical/material will not affect the health and safety of surrounding communities. • Release of the chemical/material will have little or no impact on the environment  0.8: Material is toxic. • Amount that would be released is significantly higher than currently allowed amounts. • Exposure to the material/chemical of interest could lead to a debilitating illness or death. • Adequate safeguards are not	0.01-0.12: Low Risk; Reject/Archive List  0.13-0.34: Moderate Risk; Watch List  0.35-0.64: High Risk; Action List
Chemical Release	Is DoD releasing the material? Is the release actual or potential? How much has been released, is being released, will be released? Is the release in land, air or water? Is the release time dependent? How many facilities are releasing the chemical? What facilities are releasing the chemical? Are DoD contractors releasing the chemical?	0.00	0.00	0.00
Scope of Exposure	How widespread is exposure? How many people will be affected? Will they be military, DoD civilian or civilian? What is the extent of the actual or potential exposure? Has exposure already occurred? Will exposure be limited to certain geographical areas? Will endangered species be threatened?	0.00	0.00	0.00
Relative Change in Health Endpoint	How does the new or proposed rule compare with current allowable limits? What is the effect on human health? What are the pathways of exposure? Will release harm the environment or endangered species?	0.00	0.00	0.00
OVERALL RISK		0.00	0.00	0.00

# SME Considers Evaluation Criteria

- Is the DoD releasing the material?
- How many facilities are releasing the chemical?
- How widespread is exposure?
- How does the new or proposed rule compare with current allowable limits?

ICAT <sup>SM</sup>				
CONTAMINANT 1				
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Relative Change in Health Endpoint	How does the new or proposed rule compare with current allowable limits? What is the effect on human health? What are the pathways of exposure? Will release harm the environment or endangered species?	0.00	0.00	0.00
OVERALL RISK		0.00	0.00	0.00



# SME Evaluates Likelihood of an Adverse Impact

- 0.05: Will not happen or is very unlikely.
- 0.1: There is a slight possibility that the impact area will be affected.
- 0.3: The impact area may be affected.
- 0.5: The impact area probably will be affected.
- 0.8: The impact area will definitely be affected.

ICAT <sup>SM</sup>				
CONTAMINANT 1				
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Scope of Exposure	How widespread is exposure? How many people will be affected? Will they be military, DoD civilian or civilian? What is the extent of the actual or potential exposure? Has exposure already occurred? Will exposure be limited to certain geographical areas? Will endangered species be threatened?	0.00	0.00	0.00
Relative Change in Health Endpoint	How does the new or proposed rule compare with current allowable limits? What is the effect on human health? What are the pathways of exposure? Will release harm the environment or endangered species?	0.00	0.00	0.00
OVERALL RISK		0.00	0.00	0.00

# SME Evaluates the Severity of Impact

Different scoring criteria for each impact area based on the following general scoring system.

- 0.0-0.2: Low severity, not widespread, minimal changes, substitutes, available at comparable cost.
- 0.2 - 0.6: Medium severity, slight disruptions, substitutes more expensive.
- 0.6 - 0.8: High severity, widespread, major change required, technology not available.

ICAT <sup>SM</sup>				
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Relative Change in Health Endpoint	How does the new or proposed rule compare with current allowable limits? What is the effect on human health? What are the pathways of exposure? Will release harm the environment or endangered species?	0.00	0.00	0.00
OVERALL RISK		0.00	0.00	0.00

# ICAT<sup>SM</sup> Generates Risk Rating

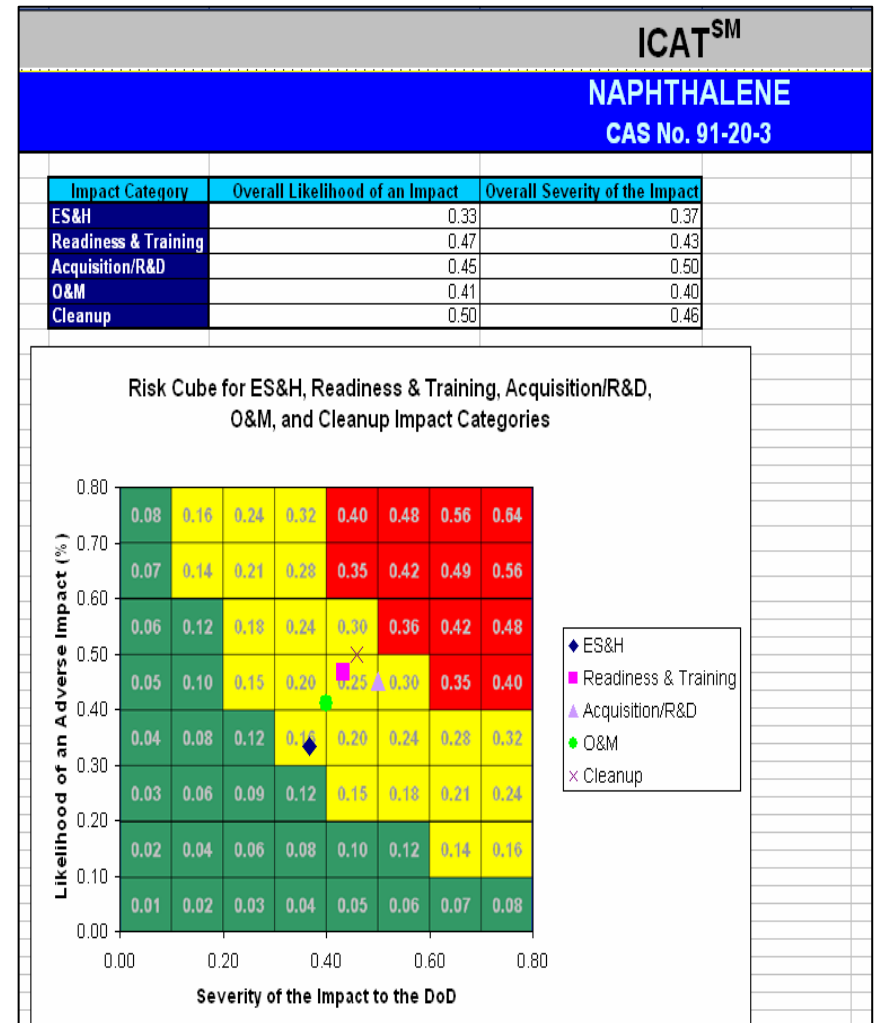
- Overall Likelihood of an Impact.
- Overall Severity of the Impact.
- Overall Risk of ES&H Impact Area.

ICAT <sup>SM</sup>				
CONTAMINANT 1				
CAS No. ###-###-#				
ES&H Impact Category	Evaluation Criteria	Likelihood of an Adverse Impact as a Result of Regulatory, Scientific, or Political Change (%)	Severity of the Impact to the DoD	Overall Risk of ES&H Impact Factor to the DoD
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Relative Change in Health Endpoint	How does the new or proposed rule compare with current allowable limits? What is the effect on human health? What are the pathways of exposure? Will release harm the environment or endangered species?	0.00	0.00	0.00
OVERALL RISK		0.00	0.00	0.00

# ICAT<sup>SM</sup> Generates Risk Cube

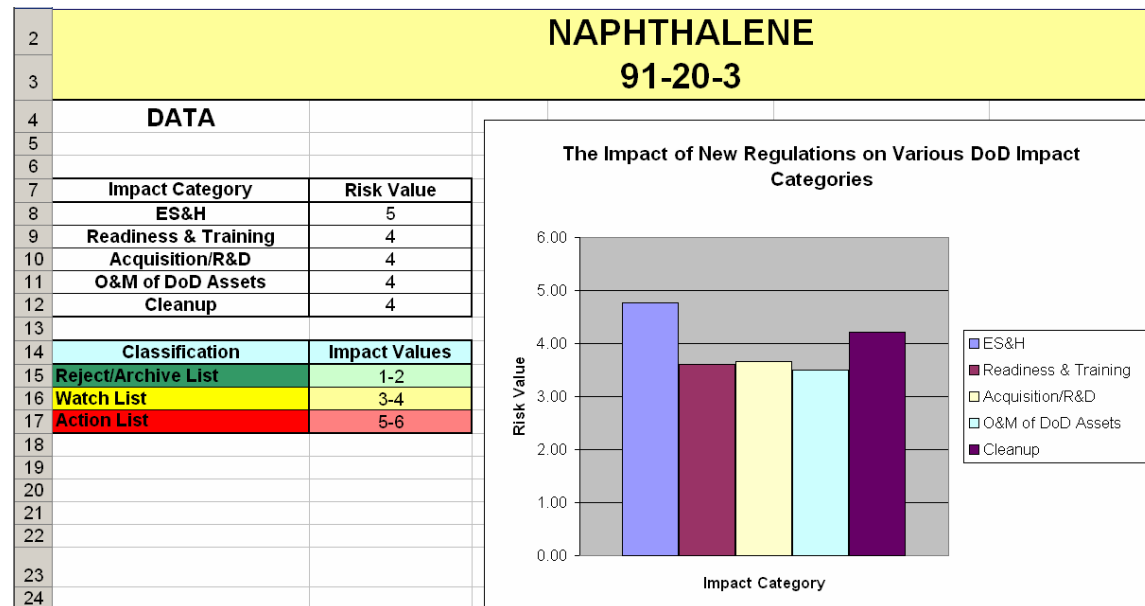
■ Risk cubes generated with risk values for each individual Impact Category:

- Action List: RED (0.01-0.12)
- Watch List: AMBER (0.13-0.29)
- Reject/Archive List: GREEN (0.30-0.64)



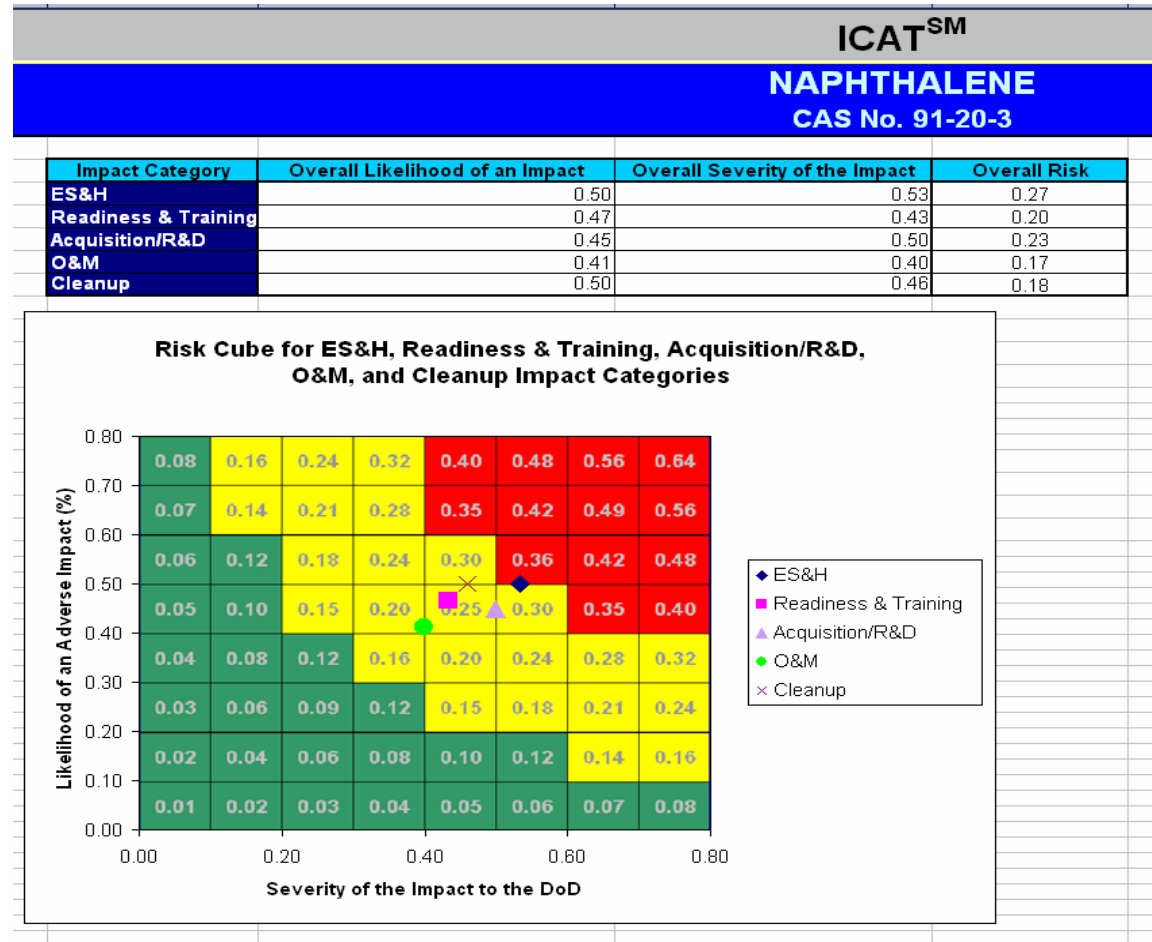
# Application of ECAT<sup>SM</sup> to Naphthalene

- CIV of 20 places naphthalene at the top of the Watch List.
- Health risks include hemolytic anemia, cataracts, cell damage.
- Common component of petroleum products.
- Rating will increase if toxicity studies show naphthalene to be a human carcinogen.



# Application of ICAT<sup>SM</sup> to Naphthalene

- Places naphthalene on the Watch List for all impact categories.
- Suggests that a Phase II assessment should be performed.



# Questions

## Materials of Evolving Regulatory Interest Impact Assessment

### Project No. 0429-OSD2

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